along the Washington and Oregon coasts reported it on 9 days.

TEHUANTEPECER OF NOVEMBER 24, 1939

By WILLIS E. HURD

During the afternoon of November 24, 1939, an anticyclone of considerable magnitude lay central over the southern part of the United States, with a southward extension over the Gulf of Mexico, a pressure condition especially favorable for the production of the overflow type of norther in the Gulf of Tehuantepec known as the "Tehuantepecer."

The American steamer *Columbian* was passing near the shore from east to west across the Gulf of Tehuantepec and caught the strong force of the blow. In a special report of the gale made for the Weather Bureau by the vessel's observer, Second Officer William E. Brown, several interesting meteorological points mentioned are worthy of presentation.

At local noon the ship was in latitude 15°50′ N., longitude 93°45′ W., with a wind from the northeast, force 2, barometer 29.90. The sea was smooth, with a moderate northwest swell. At 12:20 p. m., there was a slight shift of the wind to north, force 6, then a decline an hour and a half later to force 3 from the same direction. At 3:30 p. m., in 16°07′ N., 94°32′ W., the wind changed to northwest, increasing, and rising to force 10 at 4:15 p. m., later gradually hauling into north. At 10 p. m., in 15°44′ N., 95°44′ W., the wind was northeast, force 4, diminishing.

The following paragraphs are excerpts from Officer Brown's report:

> The sky was nearly overcast at noon, with cirrus and altocumulus, which moved from the north slowly. As the vessel approached the head of the Gulf, the clouds disappeared directly overhead, leaving a clear sky in the wake of the wind, but with the same type of clouds perceptible on either side of the Gulf. At all times there were heavy cumulus clouds lying in the pass of the mountains from where the wind issued.
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> The first wind encountered shortly after noon apparently was a side blow, diverted in the mountains and passing to the east of the Chimalapa Region, while the full force of the norther was not encountered until farther west, when it descended from the westward of the Chimalapa Region.
>
> The sea increased with the wind, the waves reaching a height of about 10 feet. With the increase in the sea, the swell disappeared shortly after noon. The seas being very short, the vessel shipped no water.
>
> From 5:30 p. m., in latitude 16°08′ N., longitude 94°53′ W., the air temperature dropped from 82° to 74°, and the sea temperature, from 84° to 68°, remaining so until 6:30 p. m., in 16°05′ N., 95°02′ W., when sea rose again to 82° and air began to rise.
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> The barometer was entirely normal during the period and showed only the usual 4 p. m. low.

In connection with the severe Tehuantepecer weather described in the foregoing, it may be added that, according to Weather Bureau records for the 15-year period 1924–1938, November (closely followed by January) is the month of most frequent norther gales (force 8 to 12) that occur in the Gulf of Tehuantepec during the season October to April. Practically one-fourth of the entire number reported by ships during the period have been experienced in November.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, NOVEMBER 1939

By BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

Depression, November 4–9, 1939.—This disturbance first appeared about 300 miles east of northern Mindanao, from which location it moved rapidly in a west-northwesterly direction toward Samar. A slight inclination to the west during the early morning hours of November 5 brought the center to a position about 30 miles south-southeast of Marinduque. Then, during the day, there was a change to the northwest for about 60 miles and finally, during the evening hours, a shift to the west-northwest as the center pased over Batangas Province. It entered the China Sea during the night of November 5–6. The four days, November 6 to 9, saw the depression incline to the north and northeast and finally disappear over the regions southwest of Formosa.

On November 5, when the depression center was about 50 or 60 miles southeast of Manila, and changing its course toward Batangas Province and the China Sea, a typhoon situation developed over central and southern Luzon. Late in the forenoon the low clouds began to move very fast from northwesterly and northerly directions; the wind became gusty up to 48 k. p. h. at the Observatory; and the sky had all the appearances indicating the existence of a typhoon close at hand. Yet the pressure at the Observatory was not low and did not give many indications that it would fall. In the writer's opinion, it was merely a minor surge of air from the north intensified by the circulation of the depression and the proximity of the mountains (Mount Banahao and Mount Maquiling). There was very little activity south and southwest of the depression center, a factor which made it doubtful whether or not a real typhoon was present. However, there were a few stations that reported minimum values rather low, which were caused by local effects due to the proximity of the mountains mentioned above, in the opinion of the writer. For example, Santa Cruz, Laguna Province, had a minimum pressure value of 747.70 mm. (996.8 mb.) at 4 p. m. Lucena, Tayabas Province, reported 748.7 mm. (998.2 mb.) at 2 p. m., November 5. Ambulong, Batangas Province, had a value of 749.87 mm. (999.7 mb.) at 4 p. m. of that day. Winds were from the northwest and north quadrants at Santa Cruz, but from the southwest and west-southwest at the other stations, force 5 to 8. Canlubang, Laguna Province, had westerly winds, force 5, but the pressure did not become lower than 750.77 mm. (1,000.9 mb.).

The only aspect of the upper winds to mention is the advance of a weak southwesterly current from Medan, Sumatra Island, to Zamboanga, P. I., from November 1 to 4. Then, when the depression center formed (November 4, morning map) and moved toward the archipelago, there was an extensive sector of air flowing from the southwest. The velocities, however, were weak, and no intensification resulted, except for the pressures and winds mentioned above. In the China Sea, the disturbance was of minor importance as far as available information shows.

Depression, November 6–13, 1939.—Forming about 500 miles east of Mindanao, a depression moved west-northwest, then north, inclining slightly to the north-northwest as it moved to higher latitudes. It recurved to the northeast November 10 when about 250 miles east of Isabela Province and gradually inclined to the east-northeast during the next 3 days. November 13, it passed about 200 miles south of the Bonins, apparently weakening, and the next day its center, only a low pressure area according to available data, was east of the 150th meridian.

Typhoon, November 18–26, 1939.—The morning and afternoon situation east of Mindanao, November 18, showed the presence of a depression which either formed rapidly over these regions or had developed near or over the Western Caroline Islands previously. It moved northwest about 250 miles and then inclined to the west-northwest or west-by-north, increasing all the time to

typhoon intensity. It crossed southern Samar and northern Leyte during the afternoon and evening hours of November 19, moving in a west-northwesterly direction. It was located close to and northwest of the Island of Panay on the morning of November 20, proceeding west-northwest and passing south of Mindoro Island and a short distance north of Culion. November 21 and 22 saw the storm move toward Hainan Island, but it recurved to the north and northeast after passing about 120 miles north-northeast of the Paracels. This recurvature began during the evening hours of November 22, and the morning of the 23d found the storm moving toward the locality of Hong Kong. It passed over the Colony at 4 p. m., moving east-northeast and continued during the night to move toward the Formosa Channel. November 24 and 25 saw the storm pass over the southern part of the Formosa Channel, and most likely over southern Formosa on its way to the Pacific Ocean. It gradually weakened and no trace of it could be found on the afternoon maps of November 26.

This typhoon was violent over a small area and moved rapidly. The center passed over Guiuan, Samar Pr., where the minimum pressure was 738.74 mm. (984.9 mb.) at 3:00 p. m. (November 19). Tacloban, Leyte, recorded its minimum at 5:47 p. m., the value being 739.84 mm. (986.4 mb.) with east winds, force 7. Capiz, on the northern shore of Panay Island, had 736.07 mm. (981.4 mb.) as its lowest pressure, occurring at 2:15 a. m., November 20, with north-northeast winds, force 4. It must be noted that at 2 a. m. the station had its strongest winds during the passage of the storm, namely, force 10, from the northeast. Culion, Palawan Pr., had a minimum value of 749.04 mm. (998.7 mb.) about noon of the same day as the storm passed about 50 or 60 miles north of the station. Over the China Sea, there were no ships near the center. The S. S. *Ruys* and the S. S. *Tjibesar* were south of the course of the typhoon as it entered the China Sea, and their observations coincided with the data obtained from the Philippine stations and also showed definitely that the storm was not recurving to the northeast near the archipelago. Over Hong Kong, the pressure at 0800 G. M. T. was 29.22 in. (989.5 mb.) with southeast winds of 50 knots velocity.

The greatest loss of life during the passage of the typhoon over the Philippines was due to the sinking of the motor boat *Rosario*, near Carnada Island, Masbate, with 48 persons perishing. Two persons survived to report the fate of the boat. One man was reported missing at Balangiga, Samar, and it is supposed that he was drowned. Property loss was great in Samar, Leyte, and Capiz provinces.

Preceding the appearance of the depression center on November 18, there was a steady advance of the southwest current, first at Medan on November 15 when the upper winds changed to the southwest quadrant, and then at stations of the Straits Settlements and finally at Zamboanga and Tarakan, the morning of November 18. Menado pilots were not received regularly but it seems that the upper winds over this station did not change to the southwest and west quadrants until the afternoon of November 17. Then, as the depression formed and intensified, November 18 and 19, a complete sector with southwest quadrant winds formed covering Mindanao and the southern Visayan Islands and extending to Medan and very likely to southern Borneo. This occurred as the typhoon moved toward Samar. The sequence of pilot balloon ascension reports clearly shows the merging of the advancing current of air from the southwest with the winds circulating around the storm center east of Mindanao. Over Manila, the upper winds backed from the east to the northeast as the depression intensified and moved toward Samar. In this case, the pilots showed that there must be activity in the storm center at a time when pressure values and surface wind forces were unable to indicate such development. Then, when the storm was in the China Sea and moving along a west-northwesterly course toward Hainan Island, the pilots over northern Indochina stations were excellent in showing that those stations were in no danger. For there was always flowing a west quadrant current aloft, due to the HIGH over China, which seems to have prevented the approach of a typhoon. The pilots reported from Hong Kong during these days, when the typhoon was in the China Sea, were short ascents and not regular, so that at the present writing, it is impossible to discuss the effect of the air currents over that station upon the course of the typhoon.

Depression, November 22–27, 1939.—This depression formed east of Mindanao and moved a short distance toward the northwest reaching the ocean regions about 250 miles east of southern Samar, where the center remained stationary until it filled up, November 27. During these days it was apparently of minor importance, yet it was a threat to the archipelago, because of possible intensification.

The upper winds during these days showed activity from the southwest, but the easterly current, as indicated by Guam pilots, was weak. Over the regions southwest of the depression center, Menado had southwest and west quadrant winds, likewise Balikpapan and Bandjermasin (when they reported), but Medan and the Straits Settlements showed that the current was steady and rather strong. This southwesterly current was checked and then overcome by a strong outbreak of cold air from northern China starting November 25 and covering the whole of the Philippine archipelago by the morning of November 27, when the depression was reported as filled up or moving northeast away from the Philippines.